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June 7, 2023 File No. 02218208.04-3

Mr. Stacy Bowers Land Protection Manager Virginia Department of Environmental Quality Southwest Regional Office 355-A Deadmore Street Abingdon, VA 24210

Subject: Updated Odor Management and Control Plan

Bristol Quarry Landfill - Bristol, Virginia

Solid Waste Permit No. 588 Air Permit Registration No. 11184

Dear Mr. Bowers:

On behalf of the City of Bristol (the City), SCS Engineers (SCS) is submitting the attached Updated Odor Management and Control Plan (OMCP) for the Bristol Integrated Solid Waste Management Facility (ISWMF). As part of the continued process of reviewing and assessing the practices and technologies utilized in implementing the OMCP, the Facility has modified the language in portions of the OMCP to reflect the substantial upgrades and improvements to the landfill gas (LFG) Collection and Control System, in addition to ongoing and proposed upgrades and improvements, which are anticipated to reduce fugitive LFG emissions and, thereby, enhance odor mitigation and abatement.

If you have questions or require additional information, please contact SCS at the letterhead address or Mr. Jon Hayes with the City of Bristol at (276) 645-3788.

Respectfully submitted,

D. Drundon King

Brandon King Project Manager SCS Engineers Robert E. Dick, PE, BCEE Project Director

Wheat I. Dul

SCS Engineers

DBK/RED:asd

cc: Randall Eads, Bristol City Manager

Jon Hayes, City of Bristol Dave Cochran, City of Bristol Jeff Hurst, VDEO-SWRO

Susan (Tracey) Blalock, VDEQ-SWRO

Enclosures

Bristol Integrated Solid Waste Management Facility Odor Management and Control Plan Permit No. 588



Bristol Integrated Solid Waste Management Facility 2655 Valley Drive Bristol, VA 24201 (276)645-7380

SCS ENGINEERS

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15521 Midlothian Turnpike, Suite 305 Midlothian, VA 23113 804-378-7440

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1.0 INTRODUCTION

The City of Bristol (City) prepared an initial Odor Management Plan for the Integrated Solid Waste Management Facility (ISWMF, Facility, or Landfill) in conformance with VDEQ's Submission Instruction 13: Landfill Gas Management, Remediation, and Odor Plans for Solid Waste Disposal Facilities dated June 7, 2021. The implementation of this initial Odor Management Plan was required to occur in conjunction with waste placement activities in the Permit #588 disposal cell. The Facility committed to reviewing the Odor Management Plan annually, and as part of the annual review the Facility expanded upon the original plan and will henceforth be referred to as an Odor Management and Control Plan (OMCP or Plan). The 2023 annual review of the OMCP covers changes and updates to the Landfill Gas Collection and Control System (LFGCCS), current Best Management Practices (BMPs), and strategies to optimize odor management and control based on the Expert Panel Report dated April 25, 2022.

This OMCP describes the current practices and technologies utilized by the City and its contractors to minimize off-site odors and address odor complaints received by the Facility. The Plan discusses the current best BMPs as well as available strategies under consideration to mitigate odors, including strategies for upgrading and maintaining the LFGCCS and response procedures for fugitive LFG releases and odors associated with the operation of a sanitary landfill. The Facility is evaluating the findings and recommendations regarding odor management and control from the Expert Panel Report which are referenced and considered throughout the Plan.

The structure of the plan is as follows: Section 2 is a description of odor sources and existing controls supplied by the LFGCCS. Section 3 describes existing strategies for controlling odors, including measures to increase the efficiency of the LFGCCS, and best available control technologies and practices. Section 4 describes odor monitoring procedures and hydrogen sulfide (H_2S) monitoring procedures, as well as remedial actions and responses associated with the aforementioned monitoring procedures implemented at the facility. Section 5 describes the management of odor complaints, e.g., recordkeeping and reporting practices to log odor complaints and annual reporting. Section 6 describes the community outreach program initiated by the facility and other public relations efforts related to odors, and Section 7 potential new endeavors that are under consideration by the Facility to improve odor mitigation efforts.

2.0 FACILITY DESCRIPTION

The ISWMF is now a closed solid waste facility owned and operated by the City of Bristol, Virginia. The ISWMF has three landfill units within its property boundary and ceased waste acceptance on September 9, 2022. The first landfill unit (Permit No. 221) received waste from 1977 to 1986 and is closed and capped. The second landfill unit (Permit No. 498) received waste from 1986 to 1998 and was mined until mid-2022 in order to recover airspace for potential future use as a construction and demolition debris (CDD) landfill. Mined materials were disposed in Permit 588. The third landfill unit (Permit No. 588) is a closed quarry landfill within a former limestone rock quarry that commenced operation in March 1998 and ceased waste acceptance on September 9, 2022.

The Solid Waste Permit No. 588 for the closed quarry landfill allowed receipt of up to 1,600 tons of municipal solid waste per day prior to ceasing waste acceptance, with a total permitted volume of 7,800,000 cubic yards (yd³). The quarry landfill received an average of 500 tons of municipal waste per day. There are landfill gas collection systems installed in Permit No. 221, Permit No. 588, and Permit No. 498 Landfill.

2.1 BACKGROUND

The Facility began receiving odor complaints in late October 2020. The majority of the initial complaints originated from neighborhoods located to the north of the Landfill or to the south and southwest of the Landfill in Tennessee. Previous actions taken in response to the odor complaints have included:

- City personnel driving through nearby neighborhoods to assess odors with olfactory senses.
- City personnel monitoring offsite locations to screen for typical LFG constituents such as methane and hydrogen sulfide (starting in December 2020).
- Upgrades to the LFGCCS in the quarry landfill, including a new horizontal collector and LFG collection piping. SCS Field Services completed LFG System improvements in March 2021.
- Additional cover soils placed on inactive areas of the quarry landfill In January 2021, and the size of the working face minimized.
- City personnel collecting two air samples from locations with known odors on January 10, 2021. The samples were analyzed for volatile organic compounds (method T0-15). No predominant odor-causing compounds were identified from this sampling event.
- LFG design construction and bidding documents for 21 additional LFG extraction wells in the
 quarry landfill produced in the summer of 2021. Aptim completed LFG drilling of the 21 LFG
 vertical extraction wells proposed on the SCS documents in Fall 2021. The City retained SCS
 Field Services Construction to install above grade LFG collection piping and connect to the
 existing system, as well as install dewatering pumps in select wells and dewatering piping.
- Subsequent to ceased waste acceptance, Permit No. 588 received daily cover placement and verification of soil depth testing on 10/11/22.
- Subsequent to soil cover placement activities, soil depth verification testing occurred on 5/4/23 for Permit No. 498.
- Sidewall Odor Mitigation System (SOMS) and LFG Collection System Expansion (Phase I).
 Construction of the SOMS commenced in December 2022. The LFGCCS Phase I Expansion began in March 2023.

2.2 POTENTIAL ODOR SOURCES

The ISWMF has multiple potential sources of malodorous emissions, however the primary source is assumed to be the closed quarry landfill, where fugitive decomposition gases emitted from the buried waste materials emanate from the sidewalls and landfill surface. Other potential odor sources at the site include:

- LFG emissions resulting from inefficiencies in the LFG System
- Composting operations
- Wet wells (498/588)
- Leachate seeps
- Sewage/Leachate manholes
- Areas with ponding/standing liquids (498/588)
- Elevated landfill temperatures
- Woodwaste grinding storage pile

- Construction activities involving drilling, trenching, or otherwise excavating into waste
- Exhaust from vehicle traffic

There are instances where malodorous emissions generated off-site may be mistakenly attributed to the Landfill. Examples of such off-site malodorous emissions include exhaust from vehicle traffic, highway construction, and waste hauling vehicles.

2.3 ODOR CONTROLS

The design, construction, operation, monitoring, and testing of the LFGCCS is regulated by the Facility's Stationary Source Air Permit and Title V Air Operating Permit. In addition, as required by Virginia's air quality and solid waste regulations, the Facility prepared and implemented an NSPS Design Plan and LFG Management Plan to capture and treat LFG.

The network of LFG extraction components (vertical wells, leachate cleanouts, and horizontal collectors) is a vital part of the functionality of the overall LFGCCS and contributes to controlling odors by collecting LFG generated within the waste mass and routing the LFG to one of the control devices. The LFG is combusted either at the permanent Parnell utility flare or the engine generators located in the on-site power plant. Combustion of the extracted LFG at these control devices is the primary means of destroying malodorous compounds present in the LFG. The City is exploring options for additional flare capacity for LFG combustion if model projections indicate LFG collected in the future through LFG Collection System expansion activities exceed current flare capacity.

The LFGCCS components, which enable the system to control odors, are identified in routine reports and documentation submitted to VDEQ. These components include: one permanent utility flare connected to a multi-stage centrifugal blower for extracting LFG from the landfill and, an on-site electrical generation power plant operated by Ingenco, which diverts a portion of the collected LFG away from the flare for combustion in engine generators.

3.0 STRATEGIES FOR CONTROLLING ODORS

This section introduces various strategies utilized by the Facility for effective control of malodorous emissions.

3.1 EFFECTIVE LANDFILL GAS COLLECTION AND CONTROL SYSTEM OPERATION

The Facility is required to meet all provisions of Virginia Rule 4-43.1, which incorporates the Emission Guidelines (EG) under Subpart Cf by reference, the revised National Emission Standard for Hazardous Air Pollutants (NESHAP) Rule under Subpart AAAA, and the Facility's Title V Operating Permit (No. 11184). The intent of the NESHAP standard is to protect the public health by requiring sources to control emissions of hazardous air pollutants (HAPs) to the level reflecting the maximum achievable control technology (MACT).

The Facility is required to conduct LFG extraction well monitoring on a monthly basis in accordance with 40 CFR 63.1960(a), 40 CFR 60.36f(a), and the Facility's Title V Permit (Condition 9.a). Records of the monitoring results are maintained at the facility for at least 5 years and submitted to VDEQ on a semi-annual basis in accordance with the Title V and NSR air permits.

The geographical extent of monthly wellfield monitoring is regulated by the Facility's Title V Permit condition 2.b. In accordance with these conditions, new waste in disposal cells will be incorporated into the routine monitoring activities.

In addition, the Facility is required to conduct Surface Emissions Monitoring (SEM) using a TVA-2020 gas analyzer or equivalent on a quarterly basis. This monitoring is performed in accordance with the site-specific GCCS Design Plan, the facility's Title V Permit and NSR Permit conditions, as well as the requirements of 40 CFR 63.1960(c) and (d), 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. Records of the monitoring results are maintained at the facility for at least 5 years and are submitted to VDEQ on a semi-annual basis in accordance with the Title V and NSR air permits.

Furthermore, the Facility is required to follow the Work Practice Standard as set forth in 40 CFR 63.1960(e)(2). The intent of this standard is to limit downtime of the GCCS.

Operational standards for gas collection and control systems are explained in 40 CFR 63.1958(a), (b), and (c), 40 CFR 60.34f (a), (b), (c), 40 CFR 63.1960(a)(3) and (5), and 40 CFR 60.36f(a)(3) and (5). These existing LFG system management and monitoring programs, required by the facility's Title V and NSR air permits, are implemented as a strategy for efficient LFG collection and control and for reducing LFG fugitive emissions and occurrence of LFG odors off-site.

3.2 LIMIT WORKING FACE OPEN AREAS AND OTHER EXPOSED WASTE

Virginia regulation 9 VAC 20-81-140.B.1.a states that: "unless provided otherwise in the permit, solid waste shall be spread into two foot layers or less and compacted at the working face, which shall be confined to the smallest area practicable."

As of September 9, 2022, the ISWMF ceased waste acceptance at the Permit #588 Landfill. However, subsequent to the cessation of waste acceptance, construction activities have occurred including drilling and excavation into the waste mass. Contractors spread waste overburden and cover exposed waste with adequate daily cover prior to the end of each working day.

3.3 SIDEWALL ODOR MITIGATION SYSTEM

Pursuant to the Expert Panel recommendation and Plan of Action report by SCS, the Facility designed and began installation of a sidewall odor mitigation system (SOMS) in December 2022. The SOMS consists of horizontal collector piping and wellheads connected to the existing LFG Collection System. The SOMS also includes liner and soil placement around the horizontal collector piping per SCS design to mitigate odors along the perimeter sidewall of the Permit #588 Landfill. SCS anticipates the SOMS to be completed during the summer of 2023. The operations, maintenance, and monitoring of the SOMS will be conducted by the Facility's O&M contractor. The SOMS System shall be monitored such that each collector wellhead shall operate under vacuum with a negative pressure of at least -0.01 in-wc.

3.4 LFG COLLECTION SYSTEM EXPANSION

Pursuant to the Expert Panel recommendation and Plan of Action report by SCS, the Facility designed and began installation of the Phase I LFG Collection System expansion in March 2023. The Phase I LFG Collection System expansion includes the drilling and installation of near perimeter LFG vertical extraction wells in the Permit #588 Landfill, as well as deep interior LFG extraction wells. The Phase I LFG System expansion includes additional LFG System collection header piping and dewatering

infrastructure, such as airline, dewatering forcemain piping, and pumps. SCS anticipates the Phase I LFG System to be completed Fall 2023. The operations, maintenance, and monitoring of the Phase I LFG System will be conducted by the Facility's 0&M contractor. The Facility's 0&M contractor shall focus on dewatering efforts to extract liquids from greater depths, as well as landfill gas and heat associated at greater depths. The combined increase in landfill liquids and LFG extracted will improve and mitigate odors originating from deep within the waste mass. The Phase I LFG System shall be operated under the provisions of NSPS.

3.5 TIMELY PLACEMENT OF DAILY/INTERIM/INTERMEDIATE COVER MATERIALS

Virginia regulation 9 VAC 20-81-140.B.1.c states, "daily cover consisting of at least 6 inches of compacted soil or other approved material shall be placed upon and maintained on all exposed solid waste at the end of each operating day, or at more frequent intervals if necessary" and "at least three days of acceptable cover soil or approved material at the average usage rate shall be maintained at the landfill or readily available at all times."

Virginia regulation 9 VAC 20-81-140.B.1.d states, "Intermediate cover of at least six inches of additional compacted soil shall be applied and maintained whenever an additional lift of refuse is not to be applied within 30 days. Further, all areas with intermediate cover exposed shall be inspected as needed, but not less than weekly. Additional cover material shall be placed on all cracked, eroded, and uneven areas as required to maintain the integrity of the intermediate cover system."

Interim cover systems are temporary cover systems applied to a landfill area when landfilling operations will be temporarily suspended for an extended period (typically longer than one year). At the conclusion of the interim period, the interim cover system may be removed and landfilling operations resume or final cover is installed. For select areas of the landfill that satisfy all of the following criteria, the Facility will evaluate the potential for placement of interim cover as an odor mitigation strategy:

- Areas that have not achieved final elevations (i.e., areas that are at interim grades)
- Areas that are not anticipated to receive additional waste lifts for more than 12 months
- Areas that have been identified as a chronic source of odors
- Areas that have been impacted by construction activities

The specifications for the interim cover system will be developed based on the field conditions and may include a low-permeability soil layer, an exposed geomembrane, or other interim cover designed to control odors. Areas with interim cover shall be inspected as needed, but not less than weekly.

SCS is currently designing an EVOH interim cover system under the authority of the consent decree. SCS anticipates the installation of the EVOH interim cover system to occur during the subsequent year covered under this 2023 updated OMCP.

3.6 COVER INTEGRITY MONITORING

The landfill is required to conduct cover integrity monitoring on a monthly frequency in accordance with the Title V Permit (Condition 9.a.iv). This cover integrity monitoring is performed on portions of the Landfill having received final cover, intermediate cover, and daily cover (i.e, all areas of the waste footprint). However, areas with exposed intermediate cover are to be inspected no less than weekly per 9 VAC 20-81-140.B.1.d. Records of the monitoring results and subsequent cover repairs are

maintained at the facility and are submitted to VDEQ on a semi-annual basis in accordance with the Facility's Title V and NSR air permits.

These existing monitoring and inspection programs required by the Facility's air permit are designed to reduce malodorous emissions. Surface emissions monitoring procedures also include cover inspection and facilitate remedial actions where excessive emissions are detected.

3.7 FINAL CAP INSTALLMENT

Installation of the final cover system will commence within the timeframes stipulated in the Closure Plan which is part of the Facility's Solid Waste Permit. The methods utilized in the design and construction of the Facility's final cap are explained in Section 10.5 of the Closure Plan. The Facility may consider accelerating the schedule for commencement of final cover system construction as one potential odor mitigation strategy or pursuant to the Action Plan recommendation per the Expert Panel Report.

4.0 ODOR MONITORING AND RESPONSE

This section discusses odor monitoring procedures, air monitoring procedures, remedial actions, and response procedures for addressing odor complaints at the Facility. For purposes of this Plan, the term "odor monitoring" refers to personnel using their olfactory senses to identify the character and intensity of odors, while the term "air monitoring" refers to sampling activities that measure VOC concentrations (or other chemical constituents) in ambient air. Both odor monitoring and air monitoring may occur at the landfill perimeter ("on-site") and/or in surrounding communities ("off-site").

4.1 ROUTINE ODOR MONITORING AND SAMPLING

Odor monitoring is conducted on-site by Landfill personnel during daily activities using olfactory senses. The Environmental & Safety Compliance Office (ESO) or designee is notified if detectable and objectionable odors are identified at the Facility or off-site so that response procedures can be implemented. The ESO checks the maintenance building, scale house, and Public Works building daily for air quality with a multi-gas meter. This odor monitoring is ongoing and an integral part of the overall odor mitigation program.

The City conducts routine monthly sampling at the Facility, comprised of a monthly 24-hour composite air sample collected in Summa canisters at a consistent location in the southwestern portion of the landfill property (see map in Appendix A). Samples will be sent to Pace Analytical lab for analysis using EPA Method TO-15. Additional on-site sampling may be conducted at the discretion of the City.

4.2 ODOR RESPONSE PROCEDURES

Odor complaint response procedures (from complaint receipt to investigation and monitoring/sampling) are detailed in the Odor Complaint Response Plan included as Appendix B.

Additionally, LFG system shutdowns (defined as periods of time where no part of the LFGCCS is operational) over 4 hours will trigger on-site odor monitoring as described in Section 4.1 and/or off-site monitoring and sampling with the same procedures used in the Odor Complaint Response Plan.

4.2.1 Remedial Actions

Once the odor complaint response is completed, the Facility then makes efforts to determine the source of the odor and, if possible, implement a corrective action. Staff responding to the complaint consult with other ISWMF personnel to see if operations (including construction activities) may have changed or equipment malfunctioned in the timeframe of the complaint. They proceed to conduct an inspection of the ISWMF to evaluate where odors may be present on site and ascertain if systems and equipment (such as the LFG collection system) are working correctly.

Depending on the source of the odor, the following are remedial actions that may be employed within a few days of an odor complaint:

- Install additional intermediate cover or increase the thickness of daily cover in the Permit 588 landfill.
- Perform minor repairs on the existing LFG collection system to increase vacuum within the landfill.
- Install additional wellbore seals to minimize odors at LFG well pipe penetrations.
- Increase dewatering of the LFG extraction wells to increase LFG extraction within the landfill.
- Inspect areas with pooling of liquids and repair leachate seeps.
- Employ defoaming agent to mitigate odors associated with foam in landfill liquids
- Closing and/or sealing manhole covers and access doors related to the leachate and gradient water collection and conveyance systems.

City staff also complete follow-up and corrective measures portions of the air monitoring form and attach any follow-up correspondence.

5.0 RECORDKEEPING AND REPORTING

5.1 ODOR COMPLAINTS

Air monitoring forms, lab results, and other documentation shall be maintained on-site for a minimum of five years. Hard copies of email and letter complaints will be attached to the completed form.

5.2 REPORTING

A monthly odor complaint and monitoring/sampling summary report in letter format is prepared for each month and submitted to DEQ no later than the 14th of the subsequent month. The letter report includes:

- A summary of the complaints.
- A summary of each sampling event.
- A discussion of results from sampling events.
- Updates on ongoing construction activities
- Recommendations for future actions.

 Attachments with the odor complaints, field observation forms, and test results from the month.

At a minimum, the OMCP will be reviewed by ISWMF personnel on an annual basis to evaluate whether the procedures herein need to be updated. If revisions are made to the OMCP, then the title page shall be changed to reflect the new date of the OMCP, so that the latest version is more easily identifiable.

Each time revisions are made to the OMCP and after each annual review (regardless of whether revisions are made), the event will be a logged and denoted with a revision date on the title page.

6.0 COMMUNITY OUTREACH

The City conducts regular public meetings regarding odor concerns to provide a forum for the community, and provides an online form to submit odor complaints (see Appendix C for screenshot from the City website).

7.0 ADDITIONAL STRATEGIES UNDER CONSIDERATION

The City is continuously evaluating the following new strategies to improve odor control and community relations, and will add any adopted strategies to the appropriate Sections 1-6 during Annual Reviews and/or add new strategies to this section as they develop. Strategies known to be used at other landfills, proposed actions from the 2022 Expert Panel, and emerging technologies are all included in this section.

7.1 EXPERT PANEL REPORT

The Expert Panel Report for the Bristol ISWMF was submitted to VDEQ on behalf of the Virginia Tech Department of Civil and Environmental Engineering dated April 25, 2022. The Remedial Action Plan to the Expert Panel Report was submitted to VDEQ in July 2022 to address the feasibility and prioritization of initiatives identified by the Expert Panel (Panel). Additional details regarding the implementation approach to the initiatives identified by the Panel will be addressed in the Action Plan. The following are examples of the objectives recommended by the Panel that are currently under evaluation and/or being implemented by the Facility:

- Sidewall Improvements/Odor Mitigation System
- Landfill Gas Collection System Expansion and Improvements
- Interim Cover
- On-site Benzene Treatment Facility
- Expansion of Community Outreach

7.2 OTHER POTENTIAL STRATEGIES

The City is currently evaluating other potential strategies to assist with the mitigation of odors. Some of these potential strategies include, but are not limited to, the following items.

7.2.1 Weather Station

The Facility may consider installing a weather station to record wind speed/direction data specific to the site. Comparing the location of odor complaints with current weather data is an effective tool for

determining weather-related and seasonal trends in odor dispersion, as well as determining whether or not the landfill(s) is the likely source of the odor.

7.2.2 Air Dispersion Modeling

The Facility may consider conducting air dispersion modeling exercises to evaluate the estimated fugitive LFG emissions from the existing inactive waste disposal units, as well as the active disposal area (the quarry landfill). This voluntary exercise may be useful in assessing the magnitude and direction of potential fugitive LFG emissions from the inactive landfills and enable the Facility to focus implementation of odor mitigation efforts on targeted areas of the Landfill.

Spatial complaint analysis can be incorporated into this exercise to compare complaint trends to the plumes generated by the dispersion model.

Appendix A On-site Sampling Locations



Draper Aden Associates

Engineering • Surveying • Environmental Services

2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291 Hampton Roads, VA

Raleigh, NC
Fayetteville, NC
Northern Virginia
Virginia Beach, VA

DESIGNED: AST DRAWN: AST

CHECKED: DATE: 03/31/2021

ODOR COMPLAINT RESPONSE PLAN BRISTOL, VIRGINIA

SCALE: 1" = 250'

PROJECT: B11145B-14D

FIGURE

Appendix B

Odor Complaint Response Plan

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BRISTOL ISWMF ODOR COMPLAINT RESPONSE PLAN

1 INTRODUCTION

In late October 2020, the City of Bristol Virginia began receiving odor complaints. To assess the City of Bristol's response to these odors, DEQ (in an email dated January 28, 2021) requested that the Integrated Solid Waste Management Facility (ISWMF) provide an air monitoring plan.

In response to DEQ's request, a draft air monitoring plan was prepared to outline the procedures for monitoring and sampling ambient air as part of the City's ongoing efforts to respond to odor complaints. In an email dated February 18, 2021, DEQ requested that the plan's name be changed to "Odor Complaint Response Plan" in addition to several other suggestions. The name was changed for the March 8, 2021 version of the Plan. This review and update is part of the 2023 Annual Review of the ISWMF's Odor Management and Control Plan.

Previous Monitoring Efforts

In December 2020 and January 2021, the City monitored ambient air in select offsite areas. Using a GEM 5000 and MSA ALT Air 4x hazardous gas meter, the City screened for methane, carbon monoxide, and hydrogen sulfide at those offsite locations.

On January 10, 2021, the City collected two grab samples of air in Summa canisters. Both samples were collected in locations that were experiencing odors at the time of collection; one sample was collected on Shakesville Road near the entrance to the ISWMF and the other was taken at the corner of Maryland Avenue and Poplar Street (Tennessee). Both samples were analyzed for volatile organic compounds via EPA Method TO-15. Several organic compounds were detected, but none at hazardous levels or at levels that would indicate or cause an odor problem.

Migration Potential

Odors are likely to migrate offsite via wind transmission and, due to various mechanisms such as temperature gradients, flow to low points in the terrain.

Prevailing winds in Bristol are generally to the east. Most of the area to the east of the ISWMF is forested. However, there are houses located to the northeast of the ISWMF along Pendergrass Road. These houses could potentially receive odors on windy days.

Four stream valleys adjacent to the ISWMF could provide low spots and corridors for off-site migration of the odors. One stream, a tributary of Beaver Creek, flows northwest to west of the ISWMF. This stream valley slopes down towards the Kingtown area of the City. A stream runs generally west from the ISWMF along the state line and slopes down toward the northern portion of the Fairmount area. Another stream runs southwest into Tennessee with this stream valley sloping down towards the King College and Fairmount areas. A fourth stream is located east of the ISWMF and flows southeast into Tennessee towards Middlebrook Lake. This Lake and the areas noted above all have the potential to receive odors from the ISWMF.



A site map is provided in Appendix 2 to illustrate the ISWMF and potential odor migration routes.

In addition to the typical migration mechanisms noted above, the ISWMF discharges their leachate and gradient water (groundwater that is pumped to maintain a separation from the landfill liner system) to a sanitary sewer. The sewer exits on the west side the ISWMF and then is conveyed to the Bristol, Tennessee wastewater treatment plant located approximately 14 miles southwest of the ISWMF. The ISWMF is currently involved in groundwater corrective action and constituents of concern, such as benzene, are collected in the gradient control system. Constituents from the gradient water or leachate discharged to the sanitary sewer could volatilize and create odors around sewer manholes or unsealed pipes and access points.

2 RESPONSE PROCEDURES

The following response procedures will apply when odor complaints are submitted to the Facility. ISWMF staff are anticipated to conduct a desktop investigation for each complaint, and may conduct field monitoring and/or sampling on a case-by-case basis.

Frequency

Upon receipt of a complaint (via phone at 276-645-7380, email, or letter), Facility staff will document the following information on the Odor Complaint Monitoring Form (see Attachment 1 for an example form):

- Date
- Time
- Location
- Temperature
- Wind direction and speed

Odor complaints are primarily received and logged by the City of Bristol's Help Desk via an <u>online form</u>, which records the date, time, and location automatically and places them in a log for recordkeeping purposes. This log is submitted to VDEQ as part of a Monthly Odor Report.

Odor monitoring and/or sampling may be conducted as noted below under two scenarios:

- In response to an elevated number of odor complaints, defined as the receipt of 100 or more complaints received by the City via its online form or at the referenced phone number over the course of one week (Monday-Sunday).
 or
- 2. If the LFG collection system experiences a prolonged shutdown of the LFGCCS (4 hours or more), monitoring and/or sampling will be conducted on the ISWMF property only, downwind of where suspected odors may occur.

Monitoring, Sampling and Analysis

During a monitoring/sampling event, ISWMF staff (or a consultant representative) will smell for general odors, and ambient air will be monitored using a GEM 5000 and/or a RKI GX-6000 hazardous gas meter. During the screening measurements of percentage methane (by volume of air)

and concentration of benzene (ppm) will be collected along with percentage of oxygen, percentage of nitrogen, and concentration of carbon monoxide (ppm).

If ISWMF staff perceive that odors detected by smell are from the ISWMF and/or methane or benzene are detected at a sampling location, then ISWMF staff may choose to collect a grab sample of ambient air using a Summa canister or Tedlar bag.

During the odor and/or air monitoring exercise, an air monitoring form will be completed. An example of the air monitoring form is provided in Attachment 2; this form or a similar form will be used to document sampling events. Information to include on the form will be:

- Sampling date
- Ambient temperature
- Barometric pressure (including a note whether the pressure was falling or rising during the timeframe of the monitoring)
- Weather conditions
- Person(s) conducting the monitoring
- Location of sampling (e.g., street address or intersection)
- Results of GEM monitoring
- Results of RKI monitoring
- Summa canister/tedlar bag collection information (such as CAS numbers, chemical names)
- Comments on odors detected by smell, observations of surrounding area that may affect odors (e.g., open burning)

Ambient air samples will be sent to a laboratory for analysis using EPA Method TO-15. This method determines concentration of Volatile Organic Compounds in air collected in specially-prepared canisters and analyzed by gas chromatography/mass spectrometry. At least a 14-day turnaround will be requested so that results will be available before the Monthly Report is prepared.

ATTACHMENT 1 – ODOR COMPLAINT MONITORING FORM



Odor Complaint Monitoring Form City of Bristol, Virginia Integrated Solid Waste Management Facility

						GEM 5000 MSA Alt Air 4X		Draeger Tube	Summa Canister					
Date	Time	Location	Temp (F)	Wind Dir.	Wind Sp. (mph)	CH4 %	02 %	Bal. %	02 %	LEL %	CO ppm	H2S ppm	Ammonia ppm	Collected (Y/N)
12/21/2020	7:05 PM	Booher Road	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:07 PM	Booher Road TN Side	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:10 PM	Robins Meadow Lane	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:14 PM	Hunters Crossing	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Robin Rd Bottom	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:20 PM	Robin Rd Top of hill	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:22 PM	Robin Rd at the Sparkling Brook Drive intersection	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Sparkling Brook Drive East	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Sparkling Brook Drive Center	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:30 PM	Sparkling Brook Drive West	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Mokingbird Rd Beginning	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Mokingbird Rd Middle	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:40 PM	Mokingbird Rd End	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Cardinal Lane	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:48 PM	Spanish oak road South	37	W	5	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Spanish Oak Road Middle	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	7:52 PM	Spanish Oak Road North	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	8:01 PM	Oak Forst Drive	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	8:03 PM	Forest Hills Drive South	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	8:06 PM	Forest Hills Drive Middle	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	8:08 PM	Forest Hills Drive North	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	8:12 PM	Wood Side Drive	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/21/2020	8:17 PM	Edgefield RD	37	W	5	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
		Florida Ave North	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:14 PM	Florida Ave Middle	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:18 PM	Florida Ave South	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:28 PM	Georgia Ave North	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Georgia Ave Middle	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:20 PM	Georgia Ave South	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:34 PM	Maryland Ave North	36	Calm	0	0	0	20.6	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:37 PM	Maryland Ave Middle	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:40 PM	Maryland Ave South	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:50 PM	Carolina Ave North	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:47 PM	Carolina Ave Middle	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:44 PM	Carolina Ave South	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	7:56 PM	Taylor St	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	8:04 PM	Polar St	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	8:10 PM	Spruce	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
12/22/2020	8:18 PM	Cypress St	36	Calm	0	0	0	20.8	N/A	N/A	N/A	N/A	N/A	N
		Maple St	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
		Chesnut St	36	Calm	0	0	0	20.7	N/A	N/A	N/A	N/A	N/A	N
12/23/2020	7:02 PM	Booher Road	51	SSE	8	0	0	20.6	N/A	N/A	N/A	N/A	N/A	N

ATTACHMENT 2 – AIR MONITORING FORM

BRISTOL ISWMF AIR MONITORING FORM

Sampling Date:	Weather Conditions (wind speed, direction etc.):
Ambient Temperature (°F):	
Barometric Pressure (in. WC):	Personnel:

		GEM readii	GEM readings					MSA ALT 4X readings		
Sampling Location	Time	% CH ₄	% LEL	% CO ₂	% O ₂	% Balance	CO (ppm)	H ₂ S (ppm)		

Appendix C Online Odor Complaint Form



By <u>signing in or creating an account</u>, some fields will auto-populate with your information and your submitted forms will be saved and accessible to you.

Solid Waste Facility Concerns & Odor Report

Sign in to Save Progress



The City of Bristol, VA Solid Waste Facility/ Landfill Feedback Form

Please provide instructional information regarding the city's landfill and its effects on the neighboring communities. Through constructive feedback the city can better address the issues at hand concerning the city landfill. Thank you for your assistance!

First Name*	Last Name*						
Address1*							
Address2							
City*	State*	Zip*					
Phone Number*	Email Address*						
Date and Time of the Odor concern							
mm/dd/yyyy hh:mm am/pm							
Description of Complaint							
Type of Odor:							
Odor Intensity: (based on a scale of 1 through 5)							
Select One							
Weather conditions when Odor was detected:							
Weather Conditions at the time odors were detecte weather monitoring station or internet resources):	ed (based on						
The following information isn't mandatory bu	t certainly						

National Weather Service

Contact Information

https://www.weather.gov/ilm/observations
National Weather service info. Enter your zip code at the top left search box labeled "Local Forecast"

helps the City isolate and react to issues.

Wind Direction	Wind Speed
Select One	
Rainfall	Barometric Pressure
Select One	
Humidity	Temperature
Location of Problem	
Location of Problem	
Have odors been noticed at this location in the past?	
Select One	
If so, When?	
Brief Description of Other Concern or Informat	tion.
protected by reCAPTCHA Privacy - Terms	
Filvacy - Territs	
✓ Receive an email copy of this form.	
Email address	
]
This field is not part of the form submission.	1
Submit and Print	

^{*} indicates a required field



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